



Low-emission economy: Energy efficiency at a district level

This guidance note forms part of the project [Polish-German cooperation on low-emission economy in cities](#) and builds on the outcomes of a workshop held in December 2015 in Herten. It outlines good practices and illustrates innovative municipal approaches supporting the transition towards a low-emission economy through energy efficiency at a district level, with a particular focus on buildings.

Benefits of energy-related refurbishment

- **Reduces energy bills** for households and municipalities by cutting energy consumption related to lighting, heating, cooling and ventilation, improving energy management, and upgrading installed equipment
- **Addresses energy poverty:** In 2013, 44.4% of the Polish population (17.2 million people) spent 10% of their income on their energy and heating needs.¹ This means that nearly half of the Polish population faces energy poverty
- **Improves air quality:** Reducing coal-based heating sources, i.e. a fuel switch at a household level, helps address the growing problem of air pollution. Air pollution from all sources causes around 42,400 premature deaths per year in Poland²
- **Increases the standard of living and comfort in buildings**
- **Stimulates the local market for goods and services in the area of construction**
- **Raises the value of the district and/or municipality,** especially where action is taken at a district level, and so helps address the demographic and competitiveness issues currently facing many Polish cities
- **Lowering energy consumption helps reduce energy imports from other regions** and so empowers municipalities and regions
- **Helps adaptation to global climate change**

Barriers in Poland

Polish cities face many challenges relating to the inefficient use of energy. These challenges have a particular impact on public and private budgets, as well as affecting air quality. As in Germany, delivering the benefits listed above requires a strategic, cross-sector approach to refurbishment at a district level rather than technical measures solely at a building level. Current challenges include:

¹ Owczarek Dominik, Miazga Agata (2015): Ubóstwo energetyczne w Polsce, Instytut na Rzecz Ekorozwoju, p. 7: <http://www.chronmyklimat.pl/download.php?id=283>.

² European Environment Agency 2014, Air quality in Europe – 2014 Report, p. 54: <http://www.eea.europa.eu/publications/air-quality-in-europe-2014>

- **An old infrastructure and building portfolio** dating from Communist times or from before the Second World War
- **Old, inefficient district heating systems that require modernisation**
- **Popularity of individual coal-fired heating systems** which are energy-inefficient and have a high level of particulate matter emissions (low-stack emissions account for half of the total PM10 emissions in Poland)
- **Single-family houses**, which represent over half of the housing building stock,³ are often located in low-income areas, poorly insulated and largely heated by coal;⁴ to date, financial support for their refurbishment has not delivered substantial results
- **Multiple ownership:** In post-Communist multi-family buildings, often each apartment belongs to a different private owner, making joint refurbishment more difficult
- **Lack of information and know-how** among companies and some municipal departments about how to implement efficient solutions at a district level in partnership with citizens
- **Little awareness of the benefits of integrated energy-related refurbishment** and of how to make the most of funding opportunities, both at the level of local government and of property owners
- **Little awareness of the link between energy-related refurbishment and other issues** such as energy supply and distribution, demographic and socio-economic structure of the district in question, housing policy, mobility at a district level, and the future development of the district
- **Lack of capacity and coordination in developing strategic solutions at a district level**, resulting in a fragmented approach to refurbishment and urban development (e.g. renovating streets but leaving the old infrastructure in place)
- **Tight municipal budgets**
- **Lack of investment capacity among Polish households**
- In city centres, many **historic buildings** are protected and thus more difficult to refurbish
- **Lack of data on energy consumption, household structure and property ownership**, making it difficult to develop strategic refurbishment plans

Solutions – summary of takeaways

- **Local governments have an important role to play in shaping refurbishment plans at a district level and creating financial incentives for the refurbishment of both public and private buildings**
- Improving energy efficiency in buildings is a multidisciplinary task involving **urban planning, energy production and distribution, transportation, buildings and the citizens themselves**
- The most economically efficient way to create an impact is through coordinated strategies that are planned end-to-end. This entails:
 - **Starting with a proper auditing process** to identify specific needs, weaknesses and strengths;
 - **Undertaking a feasibility check** to verify whether the project can successfully be implemented with the existing resources, regulatory framework and stakeholders;
 - **Engaging with both internal stakeholders** (different departments of city councils) **and external stakeholders** (citizens, civic society organizations, private businesses);
 - **Realizing impact analyses** to compare the actual reduction in emission with the costs of the project

³ Economodou, Marina (2011): Europe's Buildings Under the Microscope, A country-by-country review of the energy performance of buildings, Buildings Performance Institute Europe (BPIE), p. 31, http://www.europeanclimate.org/documents/LR_%20CbC_study.pdf

⁴ Zaborowski, Marek; Dworakowska, Anna (2014): Energy Efficiency in Poland 2013 Review, Single Family Houses Energy Efficiency and Air Quality, Institute of Environmental Economics, pp. 7-10, <http://europeanclimate.org/wp-content/uploads/2014/09/Energy-Efficiency-in-Poland-Review-2013.pdf>

Below, we present three case studies that provide practical solutions and lessons learned from innovative German and Polish projects in the field of energy efficiency in buildings.

Case Study 1: "Gartenstadt der Zukunft", Herten-Gelsenkirchen

Herten and Gelsenkirchen have joined forces to revitalise the old coal miners' settlements located on the border between the two municipalities in the districts of Hassel, Westerholt and Bertlich. The aim of the project is to reduce household energy bills while cutting the municipalities' greenhouse gas emissions (both Herten and Gelsenkirchen have climate protection strategies in place). At the same time, the objective is to raise the value of this historical district and preserve its distinctive character.

Key features

- Innovative financial scheme for private owners: Funding for energy-efficiency measures in households is calculated on the basis of the potential for reducing greenhouse gas emissions, using the following formula: $\text{EUR } 50 \times \text{kg of saved CO}_2/\text{m}^2 \times \text{useable area/year}$
- Promotion of joint refurbishment of neighbouring buildings
- Focus on preserving the historical character of buildings and maintaining or improving their value



Future show home of *Gartenstadt der Zukunft*. © adelphi

Takeaway messages

- **Applied research and individual advisory services can help overcome potential preconceptions:** The district office discovered that the solutions creating the biggest energy savings were replacing heating systems and insulating roofs and cellars. By contrast, replacing windows came in fourth place in terms of energy savings, and insulating exterior walls came fifth.
- **When deciding about specific investments in the property portfolio, it is necessary to calculate the outcomes of the retrofit over the full timeframe and take into account hidden costs and benefits.** Climate-friendly technologies which may initially be more expensive deliver greater energy savings and emission reductions in the long term.
- **A financial incentive based on CO₂/m² allows for the retrofitting of small houses**, whereas the usual energy-related funding programmes target larger buildings.
- **Climate-friendly refurbishment can go hand-in-hand with an increase in quality of life for residents.** In this case, the project focused on expanding living area through refurbishment.
- **Cost-efficient solutions can be found within the community**, e.g. buying construction materials or employing skilled workers on a joint basis, or the local community carrying out simple measures itself.
- **Even if the municipality does not own the buildings that are to be refurbished, it is possible to create smart financial incentives that encourage owners and neighbours to undertake refurbishment on a joint basis and hence maintain a uniform appearance of the buildings.** In this project owners can receive grants from the municipality if they follow certain standards for selected refurbishment measures defined by the team of architects, based on the historical design of the district. The full grant is available only if more than three neighbouring units are refurbished at the same time; in the case of fewer than three units, only 50%.

Outcomes The project is currently in the implementation stage: the financial scheme has been set up and initial information events have taken place. The district office advises citizens and owners on request, and a model house has been created for demonstration and promotion purposes.

Funding Citizens can apply for grants from the municipality under the local *Energielabor Ruhr* directive. 87.5% of the funding for this comes from the national Ministry of Environment programme "National Projects for Urban Planning". The cities of Herten and Gelsenkirchen each provide a further 5% of the total budget and the *Klimabündnis* association provides the remaining 2.5%. The *Energielabor Ruhr* programme also includes a number of other activities; the refurbishment project *Gartenstadt der Zukunft* in Hassel/Westerholt/Bertlich represents about 40% (EUR 1,720,000) of its total funds.

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Case Study 2: Energy and Water Management Program, Częstochowa

The city of Częstochowa designed and began implementing its unique resource management programme in 2003. The aim of the pilot programme "Energy and environmental management in the public buildings of Częstochowa" was to examine the potential for the efficient use of resources, energy and water, and the possibility of achieving budgetary savings at a local level.

Key features

- Technical and financial audit of over 200 public buildings
- Renegotiation of contracts with energy and water suppliers
- Joint tendering and purchases of electrical energy and natural gas
- Retrofits in public buildings



Monitoring of the energy use © City of Czestochowa

Takeaway messages

- **Energy and water management can achieve substantial savings in city budgets:** Savings of PLN 27 million (more than EUR 6 million) were achieved in the city of Częstochowa over a period of ten years (2003-2014)
- **Auditing the public building portfolio should cover both technical and financial aspects.** There is a need for verification of the actual use of energy resources, electricity and water, as well as utility bills, including assessing existing contracts and potentially renegotiating the conditions. A useful tool is joint tendering and purchases. Częstochowa uses this tool for power supplies to all its public buildings and public companies, and for the purchase of natural gas for heating purposes
- **Energy management and auditing processes require good coordination:** Depending on the size of the public buildings portfolio, there should be a specific person or even a department specially dedicated to this task. The programme in Częstochowa is implemented and coordinated by the Department of City Engineering, which has analysed the entire portfolio of public buildings (173 buildings and 57 public premises used by municipal institutions) and created a detailed database as a key tool for further water, energy and sewage management
- **IT systems are a useful instrument for energy management.** The programme "*System Monitoringu Mediów*" is managed by a software programme which receives data about the actual use of energy resources, electrical energy and water, and their cost to public institutions. All data is verified and authorised by the City Engineer's Office, which performs analyses and draws up reports based on the data

- **Public/private partnerships can bring in extra funding for investments:** The city of Częstochowa implemented the **water and energy management programme "Kropla do Kropli"** in 24 educational institutions via an ESCO (private energy service or savings company). On the basis of an EPC (energy performance contract) concluded with the directors of each of the educational institutions, the private company carried out the necessary refurbishment in the public buildings, delivering substantial savings in energy and water use. After a few years, the investment by the owners of the property pays for itself through savings from the refurbishment and lower energy and water costs
- **Close cooperation with energy suppliers help secure safe, reliable access to energy for citizens:** The city works together with energy providers and oversees the need for new investments in infrastructure

Outcomes Between 2003 and 2014, the implementation of the energy and environment management system led to a considerable decrease in **energy consumption (almost 200,000,000 kWh)** and **water use (678 931m³)**. This led to **savings for the city budget of approximately PLN 27 million (more than EUR 6 million)**. In the same period an estimated **83,689 tonnes of CO₂ emissions were avoided**.

Funding The Department of the City Engineer is financed from the budget of the city of Częstochowa.

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Case Study 3: InnovationCity, Bottrop

In 2010 Bottrop applied for funding in a competition launched by *Initiativkreis Ruhr*, an alliance of leading businesses and industries. Under the slogan "Blue sky, green city", the competition aimed to select a city that would become a model for urban renewal in the Ruhr area. Bottrop won with its project "InnovationCity". The municipality and private companies work in close collaboration to maintain and improve the value of the city and raise the quality of life of its inhabitants while reducing GHG emissions. InnovationCity is an umbrella project, whose current (but not sole) focus is on energy-related refurbishment of buildings. Already 300 projects have been initiated; the ongoing retrofit project in the district of Batenbrock-Nord is one of them.

Key features

- District-level analysis of infrastructure, energy sources, building portfolio to be refurbished and the potential of such retrofit, taking into account the social and economic background of owners and tenants
- Communication campaign and consultancy services
- Multi-stakeholder management and implementation of the initiative

Takeaway messages

- An **auditing process** for each individual building in a chosen district requires time, capacity and significant funding – but it also helps develop the solutions that bring the biggest energy savings and reflect the needs and capacities of the local population
- This can be complemented by **regularly consulting the representatives of different stakeholders** during the



© Courtesy of the city of Bottrop

- InnovationCity Ruhr project area
- ▭ Former urban redevelopment area
- ▭ Batenbrock Nord
- ▨ Historical monument protection area
- ▨ Main service area of Batenbrock Nord

development and implementation of the project to increase the rate of implementation of measures

- **Information and advisory services targeted at specific population groups pay off:** About half of the citizens receiving free advisory services under the umbrella of InnovationCity (20% of all property owners in the project area) have implemented refurbishment measures
- To implement a thorough district refurbishment strategy, a **coordinator** is needed within the municipality, i.e. a refurbishment manager. Someone needs to work full time on developing the concept and overseeing its implementation
- A **good communication strategy** is necessary to publicise the objectives and outcomes of the refurbishment project beyond the usual interested circles. This increases visibility, acceptance (including political acceptance) and encourages additional support from both the public and private sectors. InnovationCity is now being replicated in neighbouring cities such as Essen
- **Municipalities benefit from cooperation with local companies:** The InnovationCity project was initiated and is currently being carried out by a private company in collaboration with a wide range of stakeholders. Its major shareholder is the *Initiativkreis Ruhr* alliance of approximately 70 leading companies and institutions from the region. On the implementation side, participants in the Batenbrock-Nord refurbishment project include the municipality of Bottrop, technical and communication consultancies, a housing association, local skilled workers, local banks, and InnovationCity Management GmbH. This requires coordination, but it helps identify the chances for local economic development and respond to the interests and needs of citizens and businesses.

Outcomes InnovationCity has been running for five years now. Projects currently under implementation or in development are expected to deliver a reduction in greenhouse gases of close to 40% by 2020, based on 2010 levels. The implementation of the refurbishment project in Batenbrock-Nord started only recently, after the planning phase: the Refurbishment Manager took up office in December 2015 and first actions will be implemented as of March 2016.

Funding The regional government of North Rhine-Westphalia (NRW) and the European Union supported the launch of InnovationCity; the project itself is managed by a private company (InnovationCity Management GmbH). Private owners can receive grants for the refurbishment of private homes located in the area covered by InnovationCity under a dedicated local directive created by the city of Bottrop. This directive is covered by urban development funding in NRW.

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Contacts

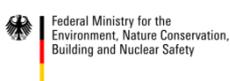
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